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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/531,481

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Frederic Cousin

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EXAMINER

BOYKIN, TERRESSA M

ART UNIT

PAPER NUMBER

1796

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/531,481	Applicant(s) COUSIN ET AL.	
	Examiner Terressa M. Boykin	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 4-15-5.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4-15-5</u> . | 6) <input type="checkbox"/> Other: _____ |

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Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 13, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by EP 801081 pages 1-10; or USP 3920624 cols. 1-10 USP 4710538 see cols. 1-10 tables I-V and claims 1,2,6,7; or USP 4958006 see cols 1-9.

It is noted that applicants' claims 1, 2, 13, and 14 are primarily directed to a process for the separation of volatile material from particulate polymer which has been substantially freed from unreacted monomer in an earlier separation step, comprising (a) feeding the particulate polymer to a purge vessel and causing it to move through the vessel in substantially plug-flow mode, (b) heating the particulate polymer in the purge vessel to a temperature greater than 30.degree. C. but insufficiently high to cause the particles to become agglomerated, and/or maintaining the polymer at a temperature in this range in the purge vessel, (c) feeding gas to the purge vessel to remove volatile material therefrom, removing the particulate polymer from the purge vessel, wherein substantially all of the heating of the particles which occurs in the purge vessel is accomplished by preheating the gas fed into the purge vessel.

USP 4710538 a process for the gas phase production of a sticky, but fluidizable, polymer comprising (i) introducing at least one gaseous monomer, which is a precursor for the polymer, into a bed of particles located in a fluidized bed reactor at a velocity sufficient to cause the particles to separate and act as a

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fluid; (ii) introducing into the bed a catalyst adapted to cause the monomer to polymerize; (iii) contacting the catalyst with the monomer at a temperature below the sticking temperature of the polymer and at a temperature and pressure sufficient to polymerize the monomer in the presence of the catalyst whereby the polymer is produced; and (iv) passing the polymer from the fluidized bed reactor into at least one fluid bed reactor wherein a fluidizing gas is passed through a bed of particles at a velocity sufficient to cause the particles to separate and act as a fluid; the polymer is passed through the fluid bed reactor in an essentially plug flow mode; and the polymer is maintained in an agitated state.

The reference notes that variations in the reactor can be introduced if desired. One involves the relocation of the cycle gas compressor from upstream to downstream of the cooler and another involves the addition of a vent line from the top of the product discharge vessel (stirred product tank) back to the top of the first reactor to improve the fill level of the product discharge vessel.

The temperature of the first reactor is maintained below the sticking temperature of the product, the temperature and pressure being sufficient to polymerize the monomer(s) in the presence of the catalyst. Typically, for a sticky polymer such as an ethylene/propylene rubber, a catalyst as described in U.S. Pat. No. 4,482,678, incorporated by reference herein; the temperature is in the range of about 10.degree. C. to about 40.degree. C. which overlaps the required range of above 30C as claimed. Note however that tables I-V discloses the temperature as 35C consistently.

The second reactor can be used to complete the removal of residual monomers through polymerization, if desired. Higher boiling monomers such as ethylidene norbornene (ENB), which is used in the production of EPDM, are conveniently removed in this fashion. The very high boiling point of this monomer prevents the use of conventional counter-current purge system since the mass transfer rate of the monomer from the resin is so low that purge bin size becomes economically unfeasible well before acceptable purging has occurred. The use of a low pressure stirred bed reactor allows for longer residence time at low cost to complete the polymerization. The addition of cycle gas provides sufficient additional monomer (in the case of EPDM ethylene and propylene) to complete the copolymerization of the higher boiling monomer. The plug flow nature of the vessel assists in monomer consumption since the resin exiting the reactor will have the same age distribution. The second reactor can also be used, for example, for propylene/ethylene block copolymer production or for chlorosulfonation or similar processes.

The product can then be sent to another fluid bed reactor (third reactor), which is the same or similar to the second reactor. Again, the resin is passed through in the plug flow mode and is maintained in a fluid state. In this case, the cycle gas purge is replaced with an inert gas purge, e.g., a nitrogen purge. This reactor can be used to complete product purging. If necessary, additional fluid bed stirred reactors can be used to complete purging, i.e., the last step can be repeated one

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or more times. Further, the third reactor and additional reactors of the same type can be used for additional polymerization, or for chlorination or chlorosulfonation. Thus, several reactors in series can carry out polymerization or polymer modification followed by one or more reactors, which carry out the inert gas purge. In any case, the plug flow nature of the horizontal stirred bed assures that all of the resin exiting the final purge will have the same age distribution and will be uniformly purged.

Again note TABLES I - VI discloses the reactor conditions as having a temperature above 30 C as claimed, i.e. at 35. degree. C.

USP 4958006 discloses a method and apparatus for the post reaction treatment of resins produced by fluidized bed polymerization of alpha olefins wherein an extruder is coupled in communication with the reactor and all necessary devolatilization of monomer, deactivation of catalysts and addition of additives are performed in the extruder.

The extruder is equipped with three vented stages defined by vents which are maintained under vacuum to remove efficiently monomers dissolved in the polymer melt. Devolatilization in the first stage is effected without the aid of stripping agents.

An advantage of not using a stripping agent in the first stage is that it is possible to recycle the vent effluent directly to the reactor through the intermediary of a compression step. It is noted in the reference that *98% of all monomer residues are recovered in the first stage*, and thus a significant economy is realized on the size of the separation unit.

It also then notes that the *amount of volatiles remaining in the polymer melt after the first stage are low but nevertheless still present. And the reference thus seeks to increase the devolatilization efficiency by injecting a stripping agent in the molten polymer through another line.* The preferred agent is water although other compounds such as isopropyl alcohol have proven to be effective in enhancing the devolatilization rate of monomer residues. Water is also preferred because it deactivates catalyst and cocatalyst residues contained in the polymer melt. Deactivation of the catalyst and cocatalyst residues are a necessary step before attempting to incorporate additives in the resin melt aimed at stabilizing the product or modifying the properties.

The reference also discloses that there are other devolatilization stages if required which are isolated from the first by means of a melt seal in a manner similar to the one described for isolating the pressurized reactor.

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USP 3920624 discloses a continuous process for stripping residual volatiles from polymer pellets, having their surfaces wet with water, by the use of an upwardly moving flow of steam through a downwardly moving column of wetted polymer pellets, moving in plug-flow, which minimizes back-mixing. The process operates with substantially less energy requirements than those of the prior art, and air pollution is eliminated since the process recovers the volatiles by condensing the steam containing the stripped volatiles and recovering them. In the preferred case, back-mixing of the pellets at the bottom of the column is minimized by feeding the pellets to the top of the column over a deflector having a circular base approximately one-half the diameter of the column and by further deflecting the pellets at the base of the column from the center axis toward the wall of the inverted conical base of the column. A novel apparatus particularly suited for carrying out the preferred process is described.

EP 801081 discloses a method of drying a solid polymer comprising contacting the polymer with a drying gas so that any solvent and/or unreacted polymerization feed materials are removed, the drying treatment comprising: (1) contacting the polymer with a gaseous polymerization feed material as a drying gas, and (2) contacting the resultant solid polymer with an inert gas-containing drying gas. Also disclosed is an apparatus for drying a solid polymer.

Preferably method uses a solid polymer with less than 20 wt.% of solvent and unreacted feed materials. Drying gas is recovered and recycled. Drying gas contains H₂. Inert gas contains He, N₂, Ar, Ne, with an O₂ content less than 5%, optionally with a water content of 0.1-70 wt.%. Drying gas is countercurrently contacted with the solid polymer.

The method is used drying solid polymers.

Solvents and polymerization feed materials are removed.

Each of the references discloses method for the eventual removal of volatile and monomer residues of a polymer via the same components as claimed by applicants. In view of the above, there appears to be no significant difference between the reference(s) and that which is claimed by applicant(s). Any differences not specifically mentioned appear to be conventional. Consequently, the claimed invention cannot be deemed as novel and accordingly is unpatentable.

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35 USC 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 801081 pages 1-10; or USP 3920624 cols. 1-10.

USP 4710538 a process for the gas phase production of a sticky, but fluidizable, polymer comprising (i) introducing at least one gaseous monomer, which is a precursor for the polymer, into a bed of particles located in a fluidized bed reactor at a velocity sufficient to cause the particles to separate and act as a fluid; (ii) introducing into the bed a catalyst adapted to cause the monomer to polymerize; (iii) contacting the catalyst with the monomer at a temperature below the sticking temperature of the polymer and at a temperature and pressure sufficient to polymerize the monomer in the presence of the catalyst whereby the polymer is produced; and (iv) passing the polymer from the fluidized bed reactor into at least one fluid bed reactor wherein a fluidizing gas is passed through a bed of particles at a velocity sufficient to cause the particles to separate and act as a fluid; the polymer is passed through the fluid bed reactor in an essentially plug flow mode; and the polymer is maintained in an agitated state.

The reference notes that variations in the reactor can be introduced if desired. One involves the relocation of the cycle gas compressor from upstream to downstream of the cooler and another involves the addition of a vent line from the top of the product discharge vessel (stirred product tank) back to the top of the first reactor to improve the fill level of the product discharge vessel.

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The temperature of the first reactor is maintained below the sticking temperature of the product, the temperature and pressure being sufficient to polymerize the monomer(s) in the presence of the catalyst. Typically, for a sticky polymer such as an ethylene/propylene rubber, a catalyst as described in U.S. Pat. No. 4,482,678, incorporated by reference herein; the temperature is in the range of about 10.degree. C. to about 40.degree. C. which overlaps the required range of above 30C as claimed. Note however that tables I-V discloses the temperature as 35C consistently.

USP 4958006 discloses a method and apparatus for the post reaction treatment of resins produced by fluidized bed polymerization of alpha olefins wherein an extruder is coupled in communication with the reactor and all necessary devolatilization of monomer, deactivation of catalysts and addition of additives are performed in the extruder.

The extruder is equipped with three vented stages defined by vents which are maintained under vacuum to remove efficiently monomers dissolved in the polymer melt. Devolatilization in the first stage is effected without the aid of stripping agents. The benefits associated with the use of a stripping agent are to foam the polymer melt to increase the surface area available for the diffusion of monomer residues and to lower the partial vapor pressure in the cavity of the vented stage in order to increase the driving forces controlling the desorption process.

An advantage of not using a stripping agent in the first stage is that it is possible to recycle the vent effluent directly to the reactor through the intermediary of a compression step. It is noted in the reference that *98% of all monomer residues are recovered in the first stage*, and thus a significant economy is realized on the size of the separation unit.

It also then notes that the *amount of volatiles remaining in the polymer melt after the first stage are low but nevertheless still present. And the reference thus seeks to* increase the devolatilization efficiency by injecting a stripping agent in the molten polymer through another line. The preferred agent is water although other compounds such as isopropyl alcohol have proven to be effective in enhancing the devolatilization rate of monomer residues. Water is also preferred because it deactivates catalyst and cocatalyst residues contained in the polymer melt. Deactivation of the catalyst and cocatalyst residues are a necessary step before attempting to incorporate additives in the resin melt aimed at stabilizing the product or modifying the properties.

The reference also discloses that there are other devolatilization stages if required which are isolated from the first by means of a melt seal in a manner similar to the one described for isolating the pressurized reactor.

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USP 3920624 discloses a continuous process for stripping residual volatiles from polymer pellets, having their surfaces wet with water, by the use of an upwardly moving flow of steam through a downwardly moving column of wetted polymer pellets, moving in plug-flow, which minimizes back-mixing. The process operates with substantially less energy requirements than those of the prior art, and air pollution is eliminated since the process recovers the volatiles by condensing the steam containing the stripped volatiles and recovering them. In the preferred case, back-mixing of the pellets at the bottom of the column is minimized by feeding the pellets to the top of the column over a deflector having a circular base approximately one-half the diameter of the column and by further deflecting the pellets at the base of the column from the center axis toward the wall of the inverted conical base of the column. A novel apparatus particularly suited for carrying out the preferred process is described.

EP 801081 discloses a method of drying a solid polymer comprising contacting the polymer with a drying gas so that any solvent and/or unreacted polymerization feed materials are removed, the drying treatment comprising: (1) contacting the polymer with a gaseous polymerization feed material as a drying gas, and (2) contacting the resultant solid polymer with an inert gas-containing drying gas. Also disclosed is an apparatus for drying a solid polymer.

Preferably method uses a solid polymer with less than 20 wt.% of solvent and unreacted feed materials. Drying gas is recovered and recycled. Drying gas contains H₂. Inert gas contains He, N₂, Ar, Ne, with an O₂ content less than 5%, optionally with a water content of 0.1-70 wt.%. Drying gas is countercurrently contacted with the solid polymer. The method is used drying solid polymers.

It is noted that applicants' claims 3 -12 primarily discloses various ways or manner in which the at least a portion of the gas fed to the purge vessel. Each of the references discloses method for the eventual removal of volatile and monomer residues of a polymer via the same components as claimed by applicants except for explicitly stating word for word applicant's means of feeding the gas to the purge vessel via the top of the vessel. It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ particular amounts and/or parameters as known in the art, since each

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of the references do disclose therein that various vessel types may be employed. For example in **EP 0801081** it is disclosed that the apparatus may be adapted to sequentially countercurrently contact a solid polymer with a first drying gas and a second drying gas and wherein the feed port is above the lower port as claimed. Note page 6 lines 36-59. Also note **USP 3920624** in the abstract, and col. 4 lines 8-45 or and col. 7 lines 17-22 it is shown that polymer pellets having surfaces wet with a film of water are continuously fed into the *top* of a vertical, downwardly-flowing bed of pellets moving in plug-flow and having an inverted conical base and drawn off at the *bottom* through the apex of the cone while steam is fed into the column near the base of the bed and flows upwardly, in a countercurrent direction to the flow of the wet pellets, picking up the vapor of residual solvent by stripping from the film of water surrounding each pellet; the steam containing the stripped volatiles at a concentration up to 25 – 30 mole % is then passed out of the *top* of the column to a conventional condensing and separating system from which the solvent stripped from the polymer pellets is recovered.

Note figure 1 of USP 4958006 discloses:

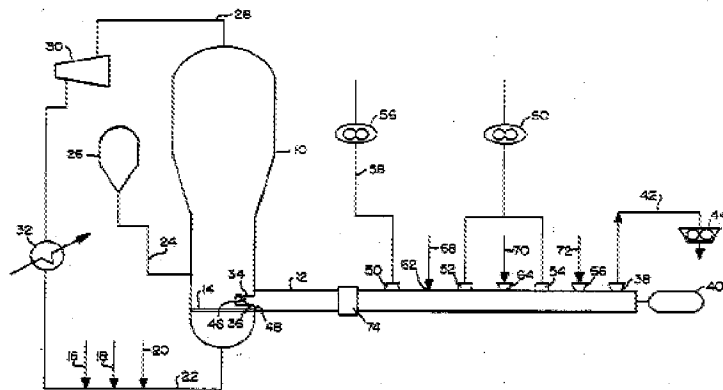


FIG. 1 illustrates an embodiment of the invention where a vented extruder is coupled directly to a reactor with a feed port positioned directly above the distributor plate of the reactor.

Lastly, note **USP 410538** discloses that variations in the reactor can be introduced if desired. One involves the relocation of the cycle gas compressor from upstream to downstream of the cooler and another involves the addition of a vent line from the top of the product discharge vessel (stirred product tank) back to the top of the first reactor to improve the fill level of the product discharge vessel.

Consequently, the claimed invention cannot be deemed as unobvious and accordingly is unpatentable.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Terressa M. Boykin whose telephone number is 571 272-1069. The examiner can normally be reached on Monday-Thursday 10-5:30 Friday (work at home).

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Terressa M. Boykin/
Primary Examiner, Art Unit 1796